

Mitutoyo

Litematic®

High-resolution Digimatic Measuring Unit

*Ultra
low-measuring
force of
0.01 N*



High-accuracy & low-measuring force *Litematic*

Litematic VL-50A

FEATURES VL-50A/50AS

Patent registered (Japan) Patent pending (Jpana)

Low constant measuring force of great reputation

- With a measuring force of 0.01N, the Litematic is most ideal for measuring workpieces that can be easily deformed or that are high-accuracy components.
- The Litematic's motor-driven spindle stops its up and down travel when it touches the workpiece. Then it allows measurements of maximums, minimums and deflection volumes.

Measurement with high-accuracy

- High-resolution with a minimum indicating value of $0.01\mu\text{m}$, and a wide measuring range of 50mm.
- The measuring table employs ceramics, a material that is rust-free and easy to maintain.
- A low heat-expansion material is used for the spindle unit, in order to minimize deformation caused by temperature variations.



Litematic Head VL-50AS



SEPARATE TYPE

- The measuring unit and the display unit are separate. This allows the user to integrate them into his measurement system. An optional stand is available.

Measuring examples



Dimension of resin pipe



Thickness of sheet



Thickness of disc



Contour of lens



Thickness of dried noodle



Dimension of machine part



Dimension of photosensitive drum



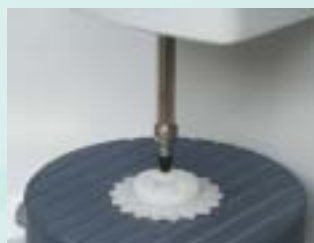
Thickness of urethane foam



Dimension of resin container



Height of shim spacer



Dimension of resin part



Thickness of rubber



Dimension of dust-proof cap



Thickness of gasket



Dimension of glass product



Dimension of light bulb



Dimension of ceramics



Dimension of pill



Dimension of machine part



Dimension of precision shaft



Dimension of bearing



Dimension of carbide ball



Contour of blade tip



Depth of key groove



Pressed contour of can lid



Dimension of sheet metal



Height of connector pin



Dimension of electronic part

Control/Display Unit



RS-232C Communication Function

Command list

Command format	Response output	Operation content
GA**CRLF	G#**, +01234.567CRLF	A display value is outputted via RS-232C *** indicates gage channel numbers 01 to 99 (00 for all channels). If LINK connection does not need to be made, set the channel number to 01. # indicates the type of data (N: current value, X: maximum value, M: minimum value, and W: TIR).
CN**CRLF	CH**CRLF	The display is switched to the current value.
CX**CRLF	CH**CRLF	The display is switched to the maximum value.
CM**CRLF	CH**CRLF	The display is switched to the minimum value.
CW**CRLF	CH**CRLF	The display is switched to the TIR value.
CR**CRLF	CH**CRLF	The display is zero-set.
CL**CRLF	CH**CRLF	The peak value is cleared.
CP**, +01234567CRLF	CH**CRLF	The preset value is inputted.
CD**, +01234567CRLF	CH**CRLF	Input tolerance limit S1 Perform tolerance setup in the order of CD and CG for 3-step tolerance judgment, and in the order of CD, CE, CF, and CG for 5-step tolerance judgment. An error message is outputted if there is a difference in tolerance limit order. If this is the case, repeat setup from the beginning of the CD command.
CE**, +01234567CRLF	CH**CRLF	Input tolerance limit S2.
CF**, +01234567CRLF	CH**CRLF	Input tolerance limit S3.
CG**, +01234567CRLF	CH**CRLF	Input tolerance limit S4.
CS**CRLF	CH**CRLF	An error is canceled.
VS**, +\$CRLF	CH**CRLF	Spindle control Sign +: Moves up the spindle, -: Moves down the spindle. \$: Speed specification 0: Stop, 1: 2mm/s, 2: 4mm/s, 3: 8mm/s approx.
VT**CRLF	CH**#CRLF	Status of spindle condition In place of #, 0: Normal, 1: Upper dead point limit, 2: WORK ON Channel number 00 cannot be used.

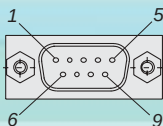
VL-50A Rear Panel



VL-50AS Rear Panel



Pin assignment



- Receptacle specification: D-sub 9-pin (male), inch thread spec.
- Applicable plug specification: D-sub 9-pin (female), inch thread spec.

Pin No.	Signal name	Input/Output	Definition
2	RXD	IN	Receive data
3	TXD	OUT	Transmit data
4	DTR	OUT	Data terminal ready
5	GND	—	Ground
6	DSR	IN	Data set ready
7	RTS	OUT	Request to send
8	CTS	IN	Clear to send
1,9	NC	—	Unconnected

Communication protocol (EIA RS-232C compatible)

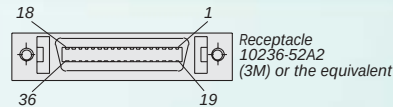
Home position	DTE (terminal) and cross cable are to be used.
Communication method	half-duplex, non-procedural
Baud rate	4800, 9600, 19200bps
Bit configuration	Start bit: 1 Data bits: (7 or 8) ASCII, uppercase Parity bit: None, even, or odd Stop bits: 2
Communication condition setup	Set with parameters.

Connector terminal Function

Applicable plug: No. 02ADB440

(with cover) Optional accessory

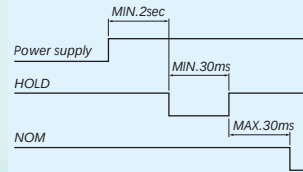
Pin assignment



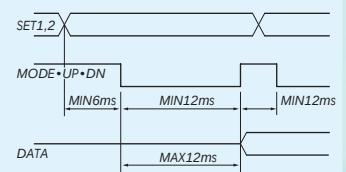
Pin No.	Signal name	Input/Output	Description (purpose)															
1	COM	—	Common terminal to input and output circuits (internally connected to GND)															
2	COM	—																
3	L1	OUT	Tolerance judgment output terminal															
4	L2	OUT	A related judgment terminal only outputs "L"															
5	L3	OUT	At error occurrence															
6	L4	OUT	L1, L5: Outputs "L"															
7	L5	OUT	L2, L3, L4: Outputs "H"															
10	NOM	OUT	Outputs "L" in the count mode.															
21	ULIMIT	OUT	Outputs "L" at the top dead point of the spindle															
22	WORK	OUT	Outputs "L" upon detection of a workpiece.															
25	SET1	IN	Specifies peak selection/motor speed in combination with SET.															
26	SET2	IN																
28	MODE	IN	Peak selection: In combination with SET. <table><tr><td>Peak Mode</td><td>SET2</td><td>SET1</td></tr><tr><td>Current value</td><td>H</td><td>H</td></tr><tr><td>MAX</td><td>H</td><td>L</td></tr><tr><td>MIN</td><td>L</td><td>H</td></tr><tr><td>TIR</td><td>L</td><td>L</td></tr></table>	Peak Mode	SET2	SET1	Current value	H	H	MAX	H	L	MIN	L	H	TIR	L	L
Peak Mode	SET2	SET1																
Current value	H	H																
MAX	H	L																
MIN	L	H																
TIR	L	L																
30	UP	IN	Motor control: Specifies a spindle ascent speed along with SET. <table><tr><td>Speed</td><td>SET2</td><td>SET1</td></tr><tr><td>8mm/s</td><td>H</td><td>H</td></tr><tr><td>4mm/s</td><td>H</td><td>L</td></tr><tr><td>2mm/s</td><td>L</td><td>H</td></tr><tr><td>1mm/s</td><td>L</td><td>L</td></tr></table> When changing the spindle speed, stop the spindle once and allows 50ms or more before change.	Speed	SET2	SET1	8mm/s	H	H	4mm/s	H	L	2mm/s	L	H	1mm/s	L	L
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8mm/s	H	H																
4mm/s	H	L																
2mm/s	L	H																
1mm/s	L	L																
31	DN	IN	Motor control: Specifies a spindle descent speed along with SET. <table><tr><td>Speed</td><td>SET2</td><td>SET1</td></tr><tr><td>8mm/s</td><td>H</td><td>H</td></tr><tr><td>4mm/s</td><td>H</td><td>L</td></tr><tr><td>2mm/s</td><td>L</td><td>H</td></tr><tr><td>1mm/s</td><td>L</td><td>L</td></tr></table> When changing the spindle speed, stop the spindle once and allows 50ms or more before change.	Speed	SET2	SET1	8mm/s	H	H	4mm/s	H	L	2mm/s	L	H	1mm/s	L	L
Speed	SET2	SET1																
8mm/s	H	H																
4mm/s	H	L																
2mm/s	L	H																
1mm/s	L	L																
32	FSW	IN	Motor control: Same function as that of the foot switch.															
34	HOLD	IN	The display value is held during input. An error is cleared at the leading edge of this signal.															
35	P.SET	IN	Executes presetting. Peak clear: The peak is cleared upon input of the P.SET signal during the HOLD signal input in the Peak mode.															
	N.C.	—	Unconnected terminal (Connect nothing) (8, 9, 11, to 20, 23, 24, 27, 29, 33 and 36 pin terminals)															

Timing Chart

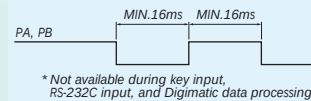
Power on characteristics



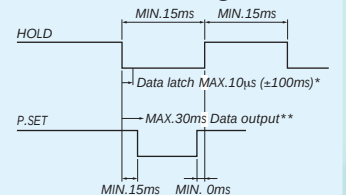
MODE/UP/DN timing



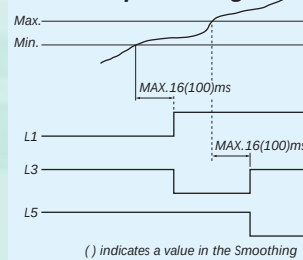
External presetting



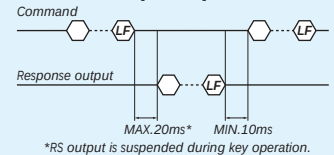
HOLD/PSET timing



Tolerance judgment result output timing



RS 232C command input and its output operation

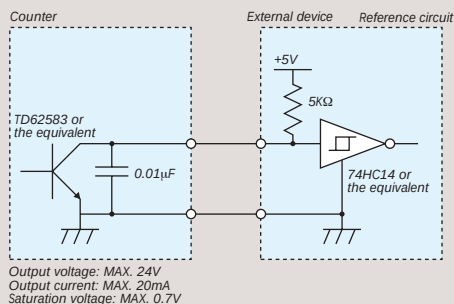


• RS-232C data output time

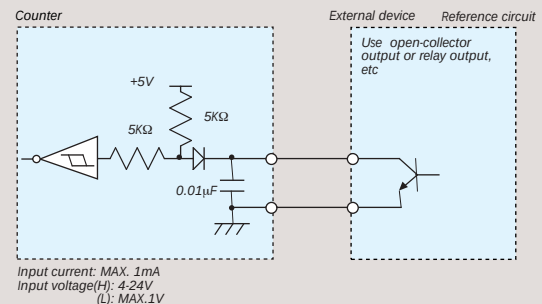
The maximum output time with the data output command (GA00CRLF) is calculated by the following formula.
Max.output time [Unit:ms] = [Number of connected counters] x 20 + [Number of link channels] x 17 (8.5) + 6 (3)
 *Baud rate: 9600bps; the value in () is that for 19200bps.
 (Calculation example) One unit of VL: Max. 43 (31.5) ms
 Note: The PC processing time is not included.

Input/Output circuit

Output circuit:
Transistor turned ON at "L" (open-collector output)



Input circuit:
Input enabled at "L"



SPECIFICATIONS

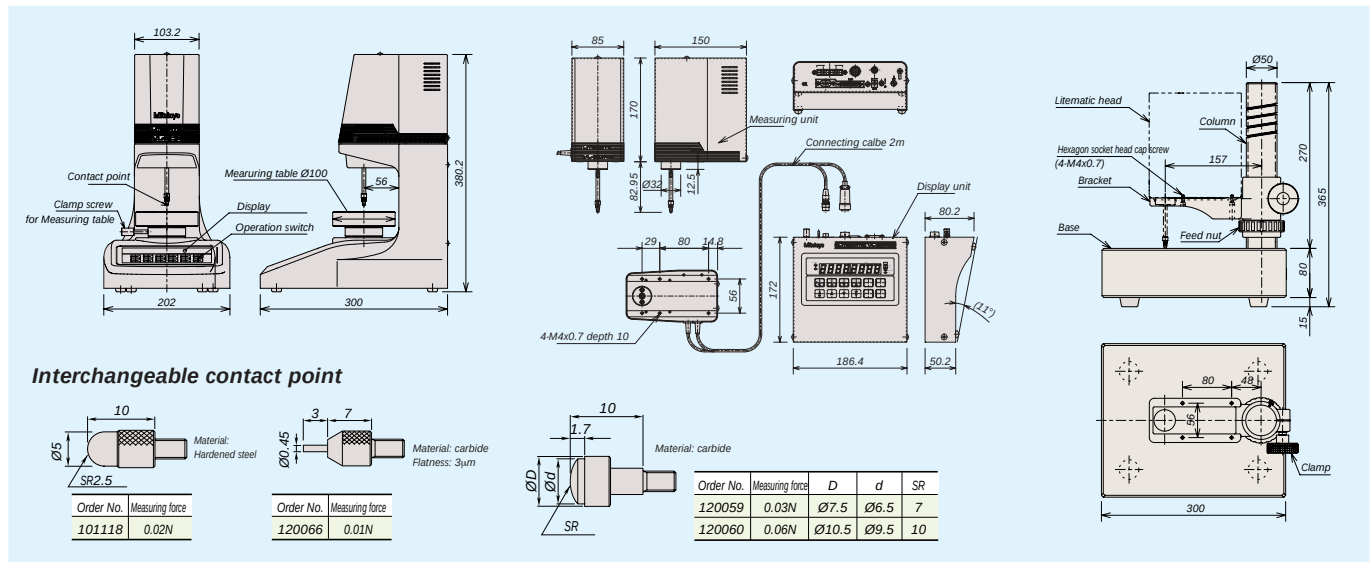
Model	VL-50A	VL-50AS
Order No.	318-211	318-213
Measuring Range*	0 - 50mm (0 - 2")	
Resolution (selectable)	0.01μm/0.1μm/1.0μm (.0000005"/.000005"/.00005")	
Display unit	Character height 14mm (.6") / 8 digits (excluding "-." sign)	
Stroke*	51.5mm (2")	
Accuracy at 20°C*	(0.5+L/100)μm L=Measuring length (mm)	
Accuracy assurance temperature**	20±1°C	
Repeatability*	σ=0.05μm (2μinch)	
Measuring force*	0.01N	
Spindle feed speed	Tracing	Approx. 0.7mm/s (.03"/s)
	Measuring	Approx. 2mm/s (.08"/s) or 4mm/s (.16"/s)
	Quick feed	Approx. 8mm/s (.3"/s)
Contact point	Ø3mm carbide ball	
Worktable	Ø100mm ceramic (grooved replaceable)	—
Data Input	Data can be input with the foot switch	
Output	Via SDP/RS-232C	
Power supply	85-264V AC	
Power consumption	12W (at max)	
Mass	16kg (35.2 lbs)	5kg (11 lbs)
Standard accessories	AC adapter No. 357651	
	Power code: (depends on the power supply used)	
	Ground wire	
	Allen wrench	
	Foot switch No. 937179T	
Optional accessories	—	Dedicated stand No. 957460
	Output connector (with cover) No. 02ADB440 (for external control)	
	RS-LINK/Digimatic connecting cable (1m) No. 936937	
	RS-LINK/Digimatic connecting cable (2m) No. 965014	

Note : To denote your AC line voltage add the following suffixes (e.g. **318-211A**). **A** for 120V, **C** for 110V, **D** for 220V, **E** for 240V. No suffix is required for 100V

* At normal measurement with the standard contact point

** Temperature variation must be gentle. The instrument must not be exposed directly to hot and cool blow.

Dimensions



Specifications are subject to change without notice.

Mitutoyo

PRECISION IS OUR PROFESSION

Mitutoyo Scandinavia AB

Släntv. 6 • Box 712

SE-194 27 Upplands Väsby

Tel: 08-594 109 50 • Fax: 08-590 924 10

info@mitutoyo.se • www.mitutoyo.se

Data transmission to the PC

Input Tool IT-005D

No. **264-005** (for Serial/keyboard port)

Input Tool IT-012U

No. **264-012** (for USB port)

Converts the digimatic output from Litematic into keyboard signals and transfers to the PC. Connecting cable 1m (No. **936937**)



Printer

Digimatic mini processor DP-1VR

No. **264-504**

Prints the digimatic output from Litematic. Connecting cable 1m (No. **936937**)

